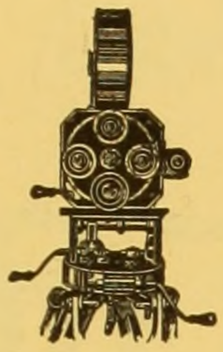
Vol. VII, No. 9
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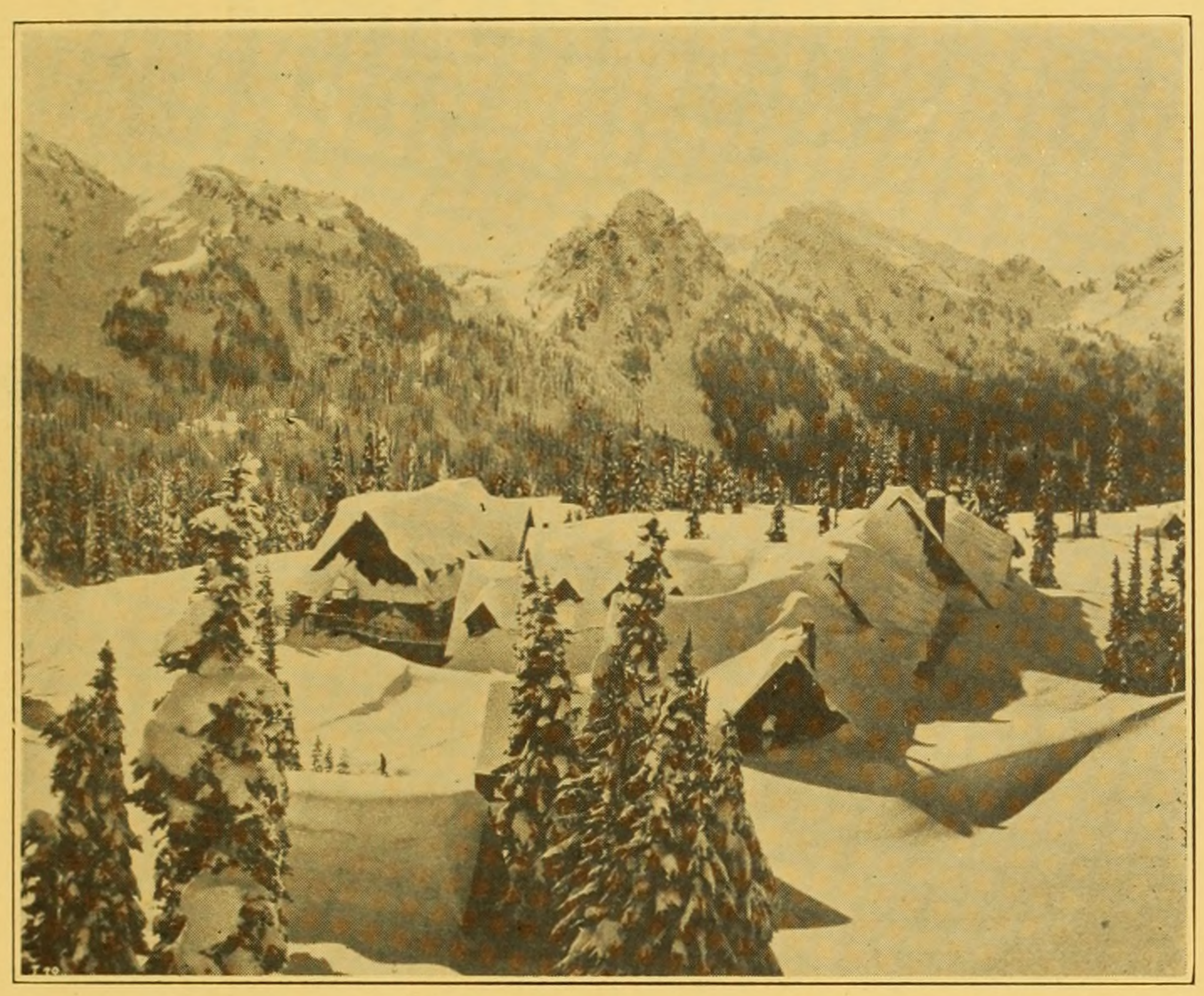
December, 1926

American Cinematographer

Published in
Hollywood, California



By American Society
of Cinematographers



"MERRY CHRISTMAS"

(Paradise Inn and the Tatoosh Range in Mid-Winter, Ranier National Park—Reproduced from Location Library of American Society of Cinematographers, Hollywood).

IN THIS ISSUE:

Air Is Dared to Get Bombing Shot—By E. Burton Steene, A.S.C.; Duplication of Motion Picture Negatives—By J. G. Capstaff and M.W. Seymour; A Professional's Notes for Amateurs [Part Two]—By Joseph A. Dubray, A.S.C.

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Vol. VII DECEMBER, 1926 No. 9

American Cinematographer

FOSTER GOSS, *Editor and General Manager*

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An educational and instructive publication, espousing progress and art in motion picture photography.
Subscription: United States, $3.00 a year; Canada, $3.50 a year; foreign, $4.00 a year; single copies 25c.
Published monthly by THE AMERICAN SOCIETY OF CINEMATOGRAPHERS, *Inc.*
Advertising rates on application.
1219-20-21-22 Guaranty Building, Hollywood, Calif. Telephone GRanite 4274
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Nick Musuraca, AS.C. has finished photographing "Lightning Lariat," an F. B. O. production, which Robert Delacy directed Included in the cast are Dorothy Dunbar, Tom Tyler and Frankie Darro. Musuraca filmed numerous location scenes at Victorville, which seems to have had a claim on the presence of A.S.C. members during the past month. Dan Clark, A.S.C., shot the action of a Tom Mix feature at the same location during a large part of the fortnight just closed.

* * *

Joseph A. Dubray, A.S.C., has concluded the cinematography on "Easy Money," a Tiffany production. The cast included Helen Ferguson, Claire MacDowell, Helen Lynch, Pat O'Malley, Geo. Hackthorne, Lawford Davidson, Heinie Conklin and Max Davidson. Direction was in the hands of Oscar Apfel.

* * *

Georges Benoit, A.S.C., is happy that these are the days which are not preceded by alcoholic nights that bring "the morning after." For, if such were the case, Georges might well question the accuracy of his sight—if he had imbibed too persuasively the preceding night—when he steps on the set for the filming of his current production at the Metropolitan studios. Be it known that it is the duty of Georges to shoot a banquet scene in which the guests partaking of food are not only Harrison Ford and Phyllis Haver, who head the cast, but embrace, in addition, one lion, one Kangaroo, one horse, one cat and one dog. Fortunately, no pink elephants or ring-tailed leopards are included. The picture is "No Control." Harry Myers is also one of the principals.

* * *

E. B. Du Par, A.S.C., has spent a busy month photographing artists of the musical world for presentation through the medium of Warner Brothers' "Vitaphone." Among these whom Du Par worked with were Vincent Lopez and his orchestra, Charles Hackett, "Whispering" Smith, and Mischa Elman; and, in addition, Bruce Bairnsfather, originator of "Ol' Bill," the hero of "The Better Ole," on which, starring Syd Chaplin and directed by Chuck Reisner, Du Par was chief cinematographer.

H. Lyman Broening, A.S.C., has been holding forth intermittently at Lake Arrowhead for location scenes for "California or Bust," an F.B.O. production which Phil Rosen is directing. In the cast are George O'Brien and Victor Potel.

* * *

Charles J. Van Enger, A. S.C., is at Laguna Beach, Calif., for the filming of scenes for First National's "The Runaway Enchantress." Milton Sills is starred, with a cast including Mary Astor, Arthur Stone, Alice White and Larry Kent.

* * *

Gilbert Warrenton, A.S.C., is reveling in the task of filming a record all-star cast for Universal's production of "The Cat and the Canary." Paul Leni is directing. Before Warrenton's camera are appearing Laura La Plante, Arthur Edmund Carewe, Flora Finch, Gertrude Astor, Martha Mattox, Creighton Hale, Tully Marshall, Forrest Stanley and George Seigman.

* * *

Tony Gaudio, A.S.C., is filming First National's "Three in Love," under the production management of Ray Rockett.

The EDITOR'S LENS • • focused by FOSTER GOSS

Concerning Make-Up

OF LATE a great deal of carelesness has been manifest among screen players in the matter of make-up. Perhaps this peculiarity of motion picture acting has become too matter of fact to warrant serious consideration from those whose popularity has been established throughout the theatre-going world. At the same time, however, there is no excnse for some of the slovenly cosmetics that have been slopped on the faces of various film players irrespective of their qoqnlarity.

¶ Lately we have been noteing examples on this point in different pictures. To us, Jack Mulhall's make-up in "God Gave Me Twenty Cents" was atrocious. Reginal Denny's in "Take It From Me" appeared too light. Harry Langdon's in "The Strong Man" seemed likewise; in fact, Langdon's make-up has always appealed to us to be by far too white.

¶ We do not know just what the object may be in attempting to make male stars appear so fair and lady-like. Certainly it does not enhance the value of their appearance or even the immediate role at hand. Strangely enough, the tendency is to run to lightness rather than to darkness. Probably it is an inherent desire to be the proverbial fair-haired boy. But the malady does not lie alone with male players. Actresses are just as culpable. To us, Clair Windsor ever has had a flair for make-up that is slightly too light, even in "Tin Hats," which, when we viewed it at Loew's State in Los Angeles, was severely criticized by the reviewers for the darkness of the screening.

¶ The simplest form of make-up is a matter of scientific study. It should not be relegated to vague approximation as to shade and the like; and, once this approximation has been arrived at, it should not be viewed as a set formula that never can be improved on. Aside from the advice from those who are experts in the intricacies of make-up, the player needs the consultation of his cinematographer. After all, it is how he is going to photograph in a given picture that counts. It is a practical matter, not a theoretical one. And we believe that the actor will always find the cinematographer more than ready, willing and able to give the necessary co-operation.

¶ It seems evident that a person, who is not a star or a feature player who is the center of attention in productions, cannot adhere inflexibily to one shade of make-up in every picture in which he or she is cast. Take, for instance, the case of a blonde actress who appears as a second lead in a film in which a brunette is the star. Naturally, all lightings and photographic treatment are keyed to the star—a brunette. It may well happen that in these scenes wherein the brunette star and the blonde second lead appear together, the latter will suffer from the fact that that which makes the former appear to best advantage scarcely is the right prescription for the latter. The thing to do, then, would seem to be for the secondary player to adapt her make-up to conform with the altered conditions at hand. No doubt she may have found, in past films, that one shade, when she appears alone or under less extreme conditions, presents her very favorably, but it should be borne in mind that the star in such a situation is the standard and that all others who appear with her should "point" their efforts, cinematographically, toward this criterion.

¶ Of course with those producers and directors who use panchromatic film where no make-up is applied, the problem does not assert itself. The natural colorings and shadings of the actors take care of themselves. However, make-up cannot be entirely eliminated—first, for character; and second, to cover up blemishes, or the lines of age bothering those players who still bask in the juvenile class.

¶ The time for taking inventory for more consistent make-up is at hand.

Honors *for* Arnold

TO JOHN ARNOLD, A.S.C., goes the honor of having been the chief cinematographer on Metro-Goldwyn-Mayer's "The Big Parade," which, during the past month, was awarded the *Photoplay* medal as the best picture made during the past year. While big things were expected of "The Big Parade," the production schedule did not allow for the time and deliberation that is conducive to superior cinematography. With no liesureness of shooting, Arnold turned out a photographic subject that truly recorded and interpreted King Vidor's direction, Laurence Stalling's story and the acting of the incomparable cast.

Cinematographic Subject

FILM RIGHTS to "War Birds," the heroic non-fiction serial which was recently concluded in *Liberty,* have been purchased by Metro-Goldwyn-Mayer, it is reported, Like "Wings," now being photographed at San Antonio, this story presents an opportunity for extremely novel cinematographic treatment. To those who regard "War Birds" as probably the most forceful serial to run in a national magazine in recent years, it is a matter of hope that this subject may be presented atmospherically, not only in photography, but in all its phases—even to the point of making the hero one who personifies the spirit of the 24-year-old fighting flyer, rather than a "big name" actor who is creaking with the advance of age.

Official Action Requested *on* Credit Title Situation

(The following letter on the subject of cutting titles is self-explanatory, and was sent by Daniel B. Clark, president of the American Society of Cinematographers, to Eli Whitney Collins, president of the Motion Picture Theater Owners of America.)

Nov. 16, 1926.

Mr. Eli Whitney Collins, President,
Motion Picture Theater Owners of America,
New York City.

Dear Mr. Collins:

For some time past, our attention has been called to the practice of exhibitors in various theaters in different parts of the country in cutting credit titles from prints shown by them. These eliminations have included the names of the cinematographers; hence our interest.

Since they are a basic and one of the most important factors in the making of a motion picture, the cinematographers feel that, as a reward for their artistic and practical efforts, they have the right to have their names remain on the credit titles. That the producers and distributors themselves are of the same opinion is indicated in the fact that these names were prominently placed there in the first place. With the cinematographer thus recognized by those who produce motion pictures, we are not approaching the situation from the angle that the exhibitor is not vested with the authority to arbitrarily cut away these credit titles. Rather we would, officially through you, appeal to the exhibitors' sense of fair play to leave these titles intact. The only logical argument that has ever been advanced in defense of the practice is that the procedure is necessary to save time; yet when it is realized that but a few seconds are gained, such an argument obviously is fallacious.

We have contributed so much to the general progress of films, and we have worked so long and hard in doing so, that we feel that we are justified in asking the exhibitors to preserve this screen recognition which, we believe you will agree, we richly merit.

Trusting that you will receive this in the spirit in which it is rendered,

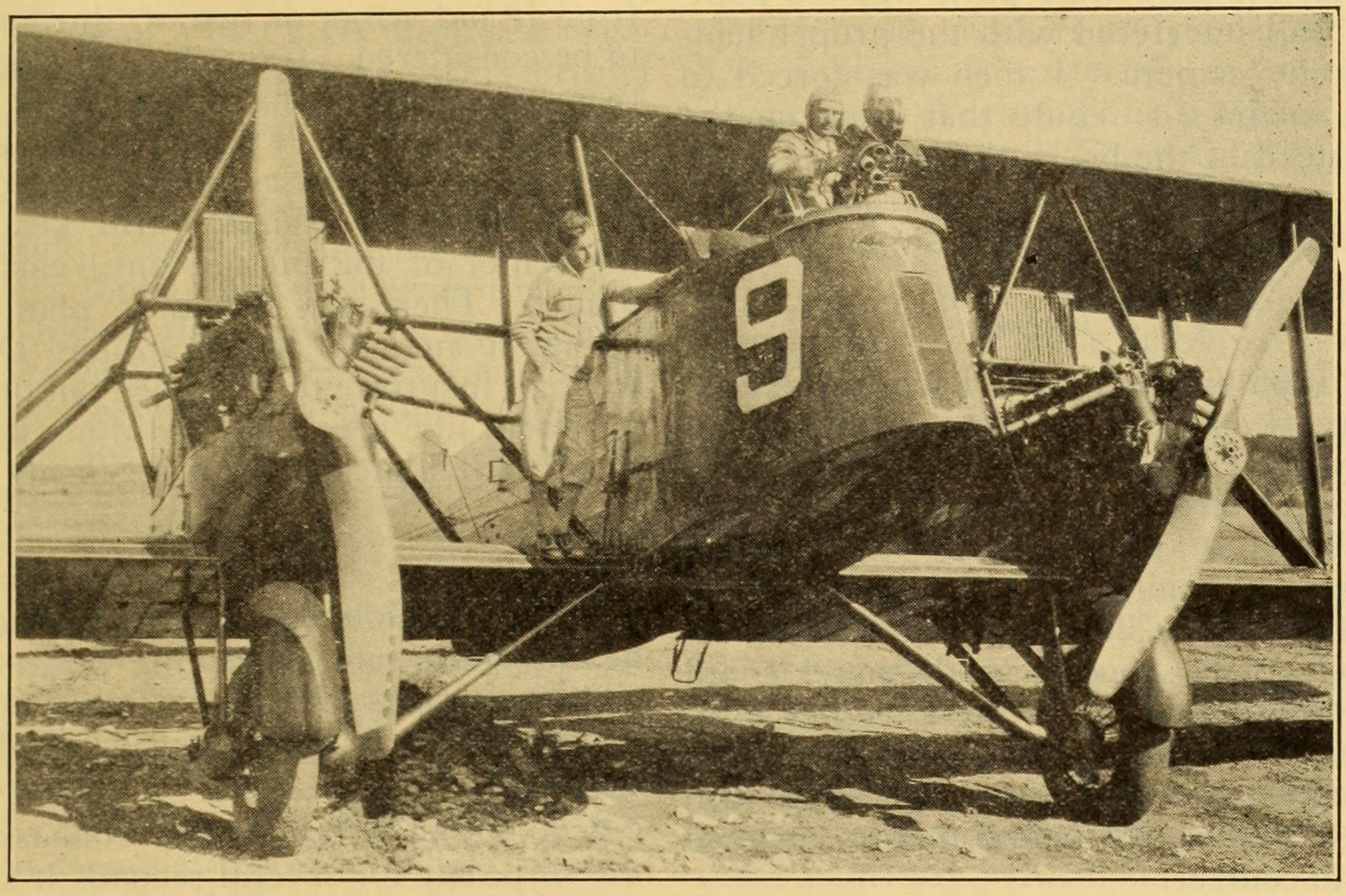
Sincerely yours,

(Signed) DANIEL B. CLARK,
President, American Society of Cinematographers.

Air Is Dared *to* Get Bombing Shot

By E. Burton Steene, A.S.C.

Thrilling Akeley Scene Made *from* Dangerous "Setup" *in* Bomber *for "Wings"*



Harry Perry, A.S.C., (at camera), chief cinematographer, and William Wellman (left), director, on "Wings," being produced by Paramount on an elaborate cinematographic scale at San Antonio, Texas.

In 1921 I was in Berlin and photographed, while there, an air picture the scenes of which were laid during the World War, and concerned Germany's supposed supremacy in the air at that time. The picture was intended for national release only and was not shown in any other country than Germany and her possessions. I was making a trip through Central Europe, and by the merest chance signed up with the concern organized to make the picture, which took but five weeks in the making. I did all the aerial work. The big thrill of the picture was a scene showing a large French ship brought down in flames, and until that time the most thrilling shot I had ever made from the air, although I have been flying since 1912 and have worked with Lincoln Beachy, Art Smith, General Chas. F. Lee, R. A. F. and many others. Beachy was killed at the S. F. fair in 1915 and Art Smith was killed at Weston-Super-Mere, England, after he had gone through the war. His ship fell 200 feet while taking a ride one calm and peaceful afternoon.

Great Thrill Comes

The greatest thrill of my life, however, has been while doing my present work with Paramount's *"Wings."* Akeley cameras are always given the most difficult "set ups" when anything big is to be done. Not content with airplanes and balloons being crashed to the earth, a whole French village is wiped out by bombs released from a giant Martin bomber, painted and revamped to simulate an enormous Gotha bomber. Chief Cinematographer Harry Perry, A.S.C., assigned me and my Akeley to the bomb compartment containing twelve 100-pound bombs of T.N.T. I was hoisted and squeezed in the remaining space in the "bombay" as the bomb compartment is called. My camera was mounted in such a position that

it was shooting straight down. Army regulations require every person going aloft to wear a regulation pack carrying an emergency parachute, one of which I wore. We made several practice flights and dropped dummy bombs over the village to get the range. I soon found that the parachute pack was too cumbersome and interfered with the proper handling of my camera. I then was forced to secure a model of 'chute that hung on the front, instead of the back; this gave me a trifle more room, as I was shooting from a kneeling position, at an altitude of less than 600 feet.

Three Eyemos

In addition to my Akeley, I had three Eyemo automatic cameras shooting down, one operated by Art Lane, an assistant, and the other two by an electrical device. The call then came "This is the picture." Everything seemed safe and snug perhaps to those on the ground but with 1200 pounds of T.N.T. six inches away in a space so small that I could scarcely move my legs in my kneeling position, suppose something went wrong and we had to make a forced landing or perhaps crash with these twelve 100-pound missles, primed to go off in contact!

Captain S. R. Stribling was pilot. Twice we circled the village, convoyed by two Fokker ships, while two Martin bombers and three smaller planes were at an altitude of about 1200 feet with cameras mounted on them to show the three invading planes below bombing the village.

From Above

Harry Perry, Faxon Dean and Paul Perry, all A.S.C. members, covered these shots from the bombers above.

On the first two trips Captain Stribling dropped a "dud" to get the range. A thin rope was fastened to my left arm which led to Captain Stribling's cockpit through the interior of the bomber from which he released the bombs. A signal of two sharp pulls was the word to tell me the bombs would be released within fifteen seconds and to start cranking. I could see nothing fore or aft, only a hole in the "bombay" directly in front of me, 2 by 4 feet. I could not see what was coming, hence the signal. Naturally the scene would be a short one as the ship was doing 90 miles and I must get the explosions of all the bombs as they hit the village.

Intense Interest

By this time, I was so interested in making a successful shot that I forgot all about the T.N.T. and everything going on. I had to keep my eye glued to the finder eyepiece—the slightest jar would knock my eye away from it and a foot or two of film lost was not to be considered. Captain Stribling gave the two yanks. The moment had come! Looking through the finder, it was my job to grind and pick up the bombs as they dropped an inch or two from my cranking arm, keep them in the center of the picture until each one exploded. There was dynamite planted in the village to augment the explosions. Down they went all in a row; they slipped out of the compartment like grease for I did not hear or see them until I picked them up in my finder.

Sure Shooting

It was a wonderful sight to see these death-dealing messengers speeding down—the terrible explosions took place right on schedule, due to the unerring eye and hand of Captain Stribling.

I do not know how far the concussion lifted the ship, but for several seconds it shook and trembled with each explosion until I thought it might possibly be out of control which of course it was not. The sensation of being rocked and thrown about in the air in a giant bomber a scant 600 feet above the ground while dropping 1200 pounds of T.N.T. is a thrill not often given to a man. In my cramped quarters it would have been very difficult if not impossible to get away with my parachute, but my confidence in the pilot kept me in repose.

Destruction Complete

The village was totally wrecked by this German invader and the scene was a great success and will be incorporated in the picture *"Wings,"* along with the thrilling shots of the three ships, bomber and two escorts, from above. There were nine planes; it must have been a beautiful sight but I for one did not see it, until the rushes were shown. All I saw was straight below. It will be a long time before I could get a thrill that this stunt gave me. It took about an hour to do the stunt. I was confined so tightly in my cramped quarters that I had to be lifted out as my legs were totally numb below the knees.

Duplication *of* Motion Picture Negatives

Fine Grain *and* High Resolving Power Are *among* Requirements *for* Material Used.

*By J. G. Capstaff and M. W. Seymour**

High Maximum Contrast Not Desired *for* Duplicating Emulsion; Many Defects Involved.

The making of a first class duplicate negative calls for greater skill and makes greater demands upon the materials than appears at first sight.

A perfect duplicate negative would be one which would give prints identical in every respect with those obtainable from the original. This means that the duplicate negative should have perfect tone reproduction and definition or sharpness and should appear no more grainy than the original. The essential requirements thus placed on the printing material are: sufficient latitude to reproduce correctly scale of tones likely to be met with in an original negative; extremely high resolving power; and fine grain. To these must be added the practical requirement of sufficient speed for contact printing. It may be said that no one emulsion excels in all of these characteristics. If an emulsion has the finest posble grain it cannot also possess the greatest latitude obtainable combined with the maximum speed, and so on.

Particular Purpose

Each type of emulsion is made for a particular purpose and consequently has the qualities most essential for that purpose even at the expense of other desirable, but less important qualities.

Motion picture negative film is especially designed for use in the camera. It has high speed to permit taking pictures when the light is not brilliant, great latitude to cover errors in exposure, and a medium value for its maximum contrast. It also has sufficiently high resolving power and fine grain to serve its intended purpose. Although it is an excellent negative material, it is not the best for making duplicates. Positive film, on the other hand, is intended for making prints for projection; it has latitude to cover the range of tones in a normal negative and the speed necessary for contact printing. It also has fine grain, high resolving power, and sufficiently high contrast to give good prints from flat negatives. The best duplicating material, however, should have even higher resolving power and a lower maximum contrast. The reasons for this will now be considered.

The Negative

A motion picture negative under the microscope is seen to be made up of black silver particles with clear interstices between. Whereas the function of the printing emulsion is to image these particles and interstices, no emulsion made has high enough resolving power to do so perfectly. The image of the granular structure always appears more ill-designed and coarse than the original, with the result that the picture when enlarged on the projection screen appears more grainy than the negative from which it was printed. The increase in graininess is not serious in positive prints from original negatives, but unfortunately it can become painfully evident in prints from duplicate negatives, because in the operation of making a master positive, then a negative from this, and finally a positive print, the grain structure is coarsened three times. It is essential then that if the graininess of the screen picture is to be kept at a minimum, the emulsion used in making both the master positive and the duplicate negative should have the highest possible resolving power.

No High Contrast

It is desirable that a duplicating emulsion should not have a high maximum contrast, not only because high contrast is unnecessary, but because of development defects that occur when development is not carried to completion, as would be the case were a high contrast emulsion used for duplicating.

The defects produced with low development are termed the "Eberhard" effect and the "Mackie" line. Eberhard, a Danish astronomer, showed that the density of small exposed areas in a film differed from that of large areas which had received the same exposure, and that the inequality was greatest when development was incomplete. He found that under these conditions a small ex-

(Continued on Page 21)

**Research Laboratory of the Eastman Kodak Company; this paper was read before the recent meeting of the Society of Motion Picture Engineers.*

Amateur Cinematography

Simple Hints *to* Aid *the* Amateur

By Hamilton Riddel

Proper Cataloging Prevents Confusion *and* Assembles Subjects *under* Kindred Heads

WHEN buying a motion picture outfit by all means purchase a suitable screen. Few amateurs realize how important a screen is for the successful projection of their movies, and are satisfied to project their pictures on a curtain, wall, or what not; this means of showing films is very poor and most times unsatisfactory. A proper motion picture screen increases the brilliancy of a projected film, has no annoying mass of creases, and properly "frames" your projected pictures.

Home-Made Screens

Many amateurs attempt to make their own screens, and of course this is possible; but it is far better to buy a screen, for you have the assurance of a perfect reflecting surface which is an art to duplicate. There are many good screens on the market, and in various sizes so that it is easy to find the one that is most suited to your special use and size of projected picture. Count it a good investment, and buy a screen; you will be surprised and pleased with the results it will give you.

PROPER MAILING

MAILING your exposed roll of film should have your proper attention. The writer has seen many rolls of film sent to the finishing laboratories packed most carelessly. It can not be too emphatically stated that the exposed roll of film must be encased within the metal container supplied with the film when purchased. Next, put the metal container in the little yellow carton, and print your name and address on it. Be sure that such notation is legible, as it's the one and only means for the laboratory to identify your film; naturally you should be as interested in this detail as the laboratory; that is, if you care anything about seeing your film again.

Utilizing Box

The writer has found that the cardboard box, in which developed films are returned from the laboratory, may serve quite well as an additional container for sending your film to the laboratory to be developed. Place the yellow carton in the cardboard box after having removed the old address label and cancelled stamp; then paste a new label on the cardboard box, properly addressed to the nearest finishing laboratory, and securely tie the box with the string.

Do not seal the box in any way as this is against postal regulations for parcel post packages. Only when sending your film by first class mail is it permissible to seal the package.

By packing your film in the manner described above you can rest assured that it will reach the finishing laboratory in good condition. If you are sending many films to be developed, a rubber stamp with your name and address can be bought for a nominal sum; this stamp is very handy for marking the yellow carton which contains your films. It is quicker and guarantees that the laboratory will always be able to identify your films.

CATALOGING PERSONAL FILMS

AS YOU obtain your personal movies, you will no doubt have films of many varied and interesting subjects. When you have six or more 100-foot rolls of film, it is time to catalog them according to subject.

Family Subjects

You will have many pictures of the family that you may not always care to show to all your friends as they are not altogether interesting to others as yourself and family. So you can start with reel number one, and only include your family pictures on it. This reel will soon grow from one to many, as the years go by, and you will, by so cataloging them, have all your family pictures together.

Pictures which you have taken while on a trip are always interesting to all your friends and are more suited to general showing; so it is well to include them under a separate projection reel. All the pictures you take of your friends can usually be so cataloged as to go on another separate projection reel. These are only suggestions, and the amateur can, and will, vary them in cataloging his films. Hence, when it's "Family Night" at your own show, you have all your personal family pictures to show, all together on their respective projection reels; or if it's "Friends' Night," you have your general pictures of your trips and movie experiences which they are bound to enjoy.

A Professional's Notes *for* Amateurs

Part II

By Jos. A. Dubray, A.S.C.

Fundamentals *and* Principles *of* Lens Construction Given Lucid Explanation

Although light travels with an extreme velocity, human ingenuity has accomplished the seemingly impossible feat of measuring this velocity to a great degree of accuracy.

It would be inconsistent with the scope of these articles to enter into a detailed description of the means by which such measurements have been secured.

Suffice to say that:

Romer measured the velocity of light through astronomical observation of the respective positions of the earth and the first satellite of the planet Jupiter at six months' intervals.

Foucault used a very ingenuous laboratory apparatus less than 14 feet long, through which a small beam of sunlight was submitted to a series of total and partial reflections and rotary deviation, which enabled him to derive a formula giving the velocity of light at a figure somewhat less but astoundingly near the results obtained by astronomical observation.

Fizeau obtained his results through terrestrial observation between two points situated at nearly 30,000 feet from each other.

A method similar to Fizeau's has been recently used in the mountains of California by Professor A. Michelson of the University of Chicago.

The following table gives some of the results obtained:

by	In the Year	Velocity per Second in Vacuo.	
		Miles	Kilometers
ROMER	1675	190,000	304,000
FIZEAU	1849	196,000	313,600
FOUCAULT	1850-1862	185,157	296,257
MICHELSON	1880	187,443	299,908
YOUNG & FORBES	1882	188,314	301,382
NEWCOMB	1882	187,413	299,860
CORNU	1900	187,750	300,400
MICHELSON	1926	186,300	298,080

These are not all the complete data available on the results obtained in the solution of this captivating problem.

We have chosen these, taking in consideration the precedence of effort, and the name of the scientist.

These results obtained by different means, in a lapse of time covering a period of 251 years, have a truly amazing significance if we consider the slight differences in the figures obtained in such a delicate undertaking.

WE shall now consider the behavior of a ray of light, incident to the smooth and highly polished surface of an opaque body; that is to say, a ray of light emanated by a luminous body, and falling upon such a surface.

A very small portion of this light is *absorbed* immediately at the surface of the body or at a small distance from it, and is extinguished.

Another portion of the incident light is *scattered,* or irregularly reflected in all directions.

This scattered light is the light that renders visible objects that are not lumnious. If this phenomena did not occur, our world would be a strange one, engulfed in total darkness, broken by intense patches of light, emanated by the lumnious bodies or regularly reflected under the formal condition which we will presently expound.

It is the scattering of the light that strikes the upper layers of the earth's atmosphere before sunrise and after sunset, that produces the well known phenomena of twilight.

Remains that portion of light, which is regularly reflected, according to well established laws.

We may note here the difference between the expressions of *theory* and *laws.* A *theory* is an accepted, but not thoroughly proven statement. In other words, a theory is the best explanation found by man of the causes producing certain phenomena.

The supposed existence of the ether and of Huyghens light-waves, upon which the undulating theory of light is based, are not absolutely proven, but only serve to explain most of the phenomena produced by light. They leave a field open for investigation and supposition from which new theories arise, such as the electro-magnetic theory of light announced by Clark and Maxwell, and the electron theory of Lorentz.

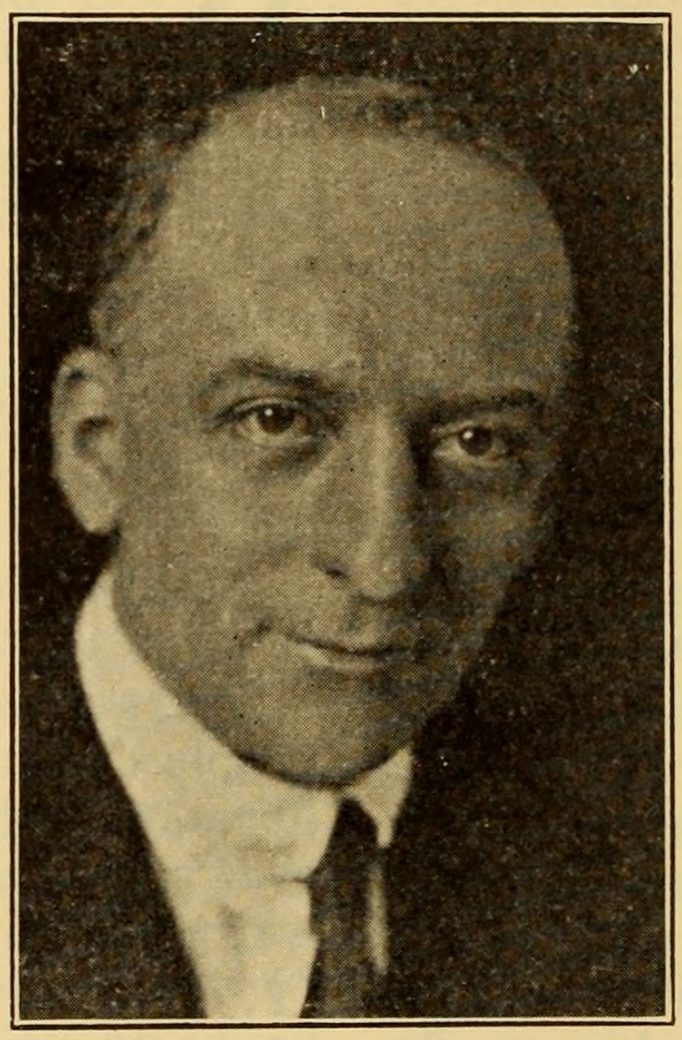
In opposition to a theory, is a *law,* which is an immutable proven fact, accepted beyond discussion, because in all cases in which the *law* has been applied to practical uses it has completely agreed with the facts derived from observation.

(Continued on Page 23)

Scientific Author Has Wide Experience

Writer *of* Articles *for* *American Cinematographer* Is Authority *in* Profession

In writing "A Professional's Notes for the Amateur," the second installment of which appears in this issue of the *American Cinematographer,* Joseph A. Dubray, A.S.C., draws from a wealth of cinematographic experience that extends over a period of years during which time he has enjoyed an enviable reputation as a cinematographer of the first magnitude.



Jos. A. Dubray, A.S.C.

Panchromatic Expert

Dubray is especially known among the profession for his pioneer work in the field of panchromatic film, having been one of the first to investigate this type of stock which is coming into an extremely wide vogue. In fact, the A.S.C. member is looked to as an authority in this line of work, in which he, now as heretofore, is conducting exhaustive experiments.

Many well-known cinematographers of today "broke in" the profession under the tutelage of Dubray, so that he is eminently fitted to write such an educational series as is appearing under his by-line in the current issues of this publication.

Scientific Study

Dubray's camera career was preceded by a thorough education in various institutions on the Continent, where he specialized in scientific studies. He was born in France and educated at the School of Chemistry at Milano, Italy, of which place of learning he is an alumnus.

He was initiated in the photographic profession in his father's portrait gallery in France. Here he, at an early date, began specializing in ortho and panchromatic work, making reproductions of classics which eventually found their way into the celebrated galleries of France, Italy, Spain, Belgium and Holland. Other phases of scientific photography gained his attention, and he devoted a great deal of time to X-ray, microphotography and spectrophotography.

Film Work

His primary experience with motion photography was as early as 1898; in the following year, he attained his first commercial results. After several years of freelancing, he became affiliated with Pathe-Freres. With this organization he served until 1910, at which pioneer date he was given the signal of honor of being assigned to go to the United States to organize and take charge of the photographic department of the Pathe studios at Jersey City.

Dubray continued this connection until 1913 when the call of freelancing again caused him to visit Cuba, Mexico and the West Indies for travel and scenic material. Coming back to the United States, he joined the Wharton Studios at Ithaca, N. Y., and remained there until 1914 when, immediately at the outbreak of hostilities, he answered the call to fight for the tri-color and was at once off for the field of battle in France. In June, 1918, he was assigned to the Fifth Division of the A.E.F., as interpreter, and served in this capacity until the conflict closed.

Back to Camera

Following the armistice he hastened to New York to resume his cinematographic career. He became identified with Famous Players-Lasky with whom he served for several months, at the end of which time he came to Southern California to be chief cinematographer for Louis Gasnier. He photographed many of that director's efforts, including "Kismet." Then came a long engagement over a period of four years with Robertson-Cole, after which he again took to freelancing in which he at the present is still engaged.

Dubray is an accomplished linguist. Besides English, he speaks fluently, among other tongues, French, Spanish and Italian.

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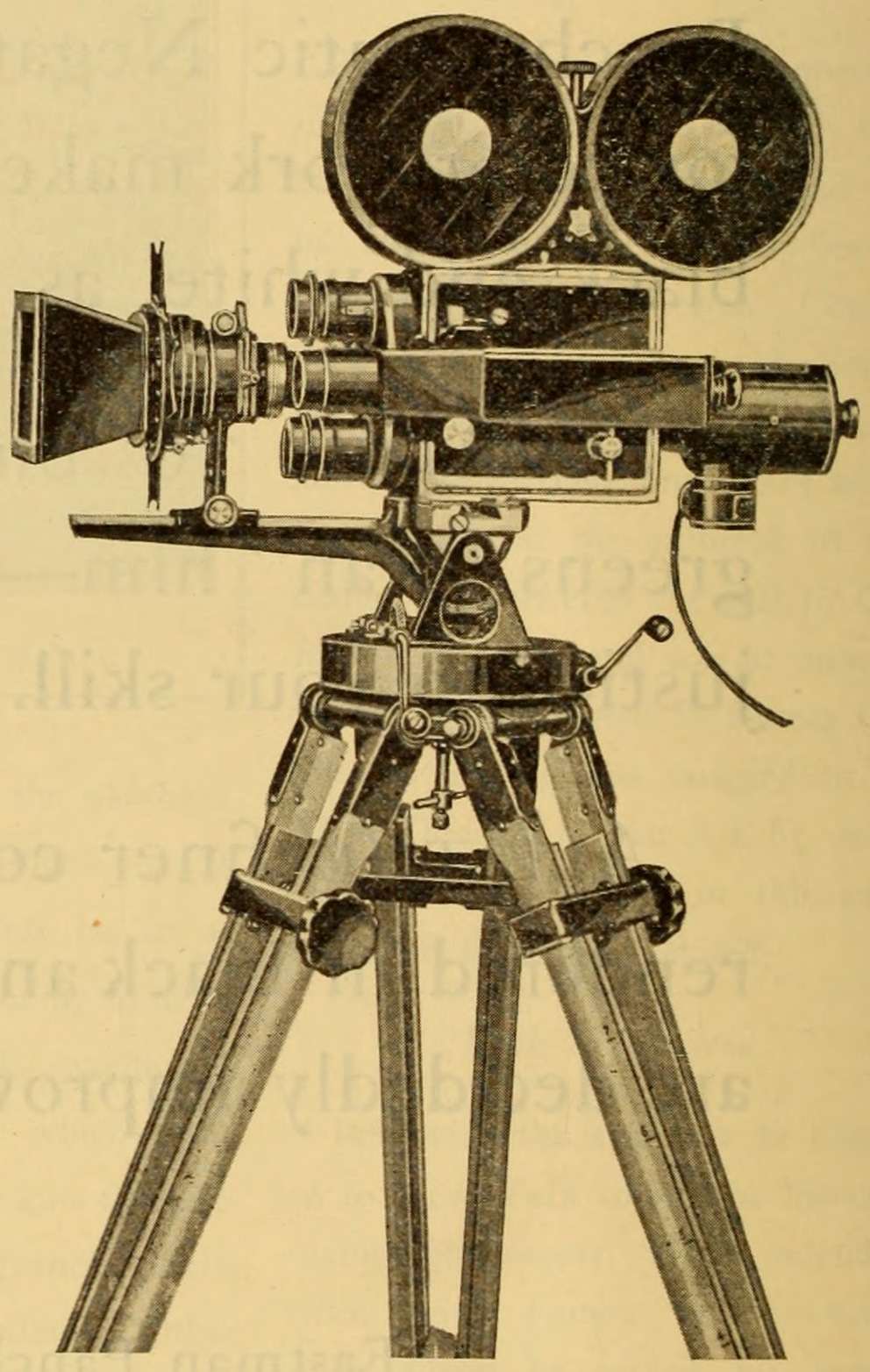
Why is it that Bell & Howell Cameras are found on practically every movie lot in the world?—now, as they have been for twenty years?

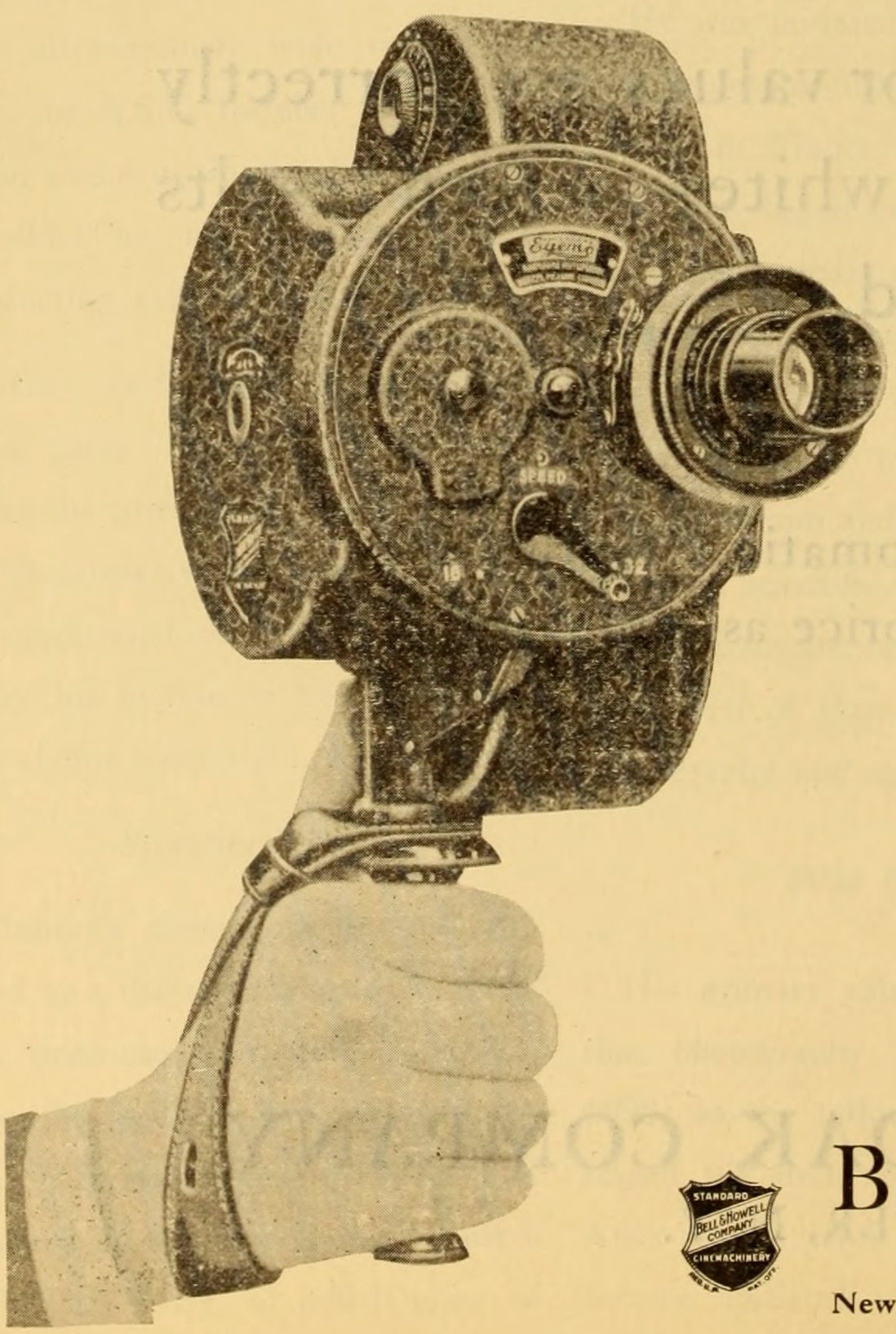
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Motion *and the* Art *of* Cinematography

By Slavko Vorkapich

Conclusion *of* Savant's Lecture Expounding Revolutionary Ideas *on* Films

(Continued from Last Month)

The next day, if you still have the ambition to study motions, take a similar ride and try to grasp all those motions, seeming and actual, at once, as a whole, as a continuity simultaneous and successive. Then go to Henry's, or to some other cafe, where they will let you sit for a while and watch people's motions.

As you approach the door, you will see in it a transparent reflection of yourself, and the cars and people passing back of you, and at the same time the people and the waitresses inside the cafe. As you enter, and, while closing the door, if you turn around, you will get just a flash of the boulevard once more, then, turning back again, you will perceive a confused picture of the whole cafe. It will be out of focus for a moment. You will experience a feeling of strangeness, no matter how familiar the cafe is to you, because the arrangement of the people is always novel and unexpected; then you will perhaps look for a familiar face, and if you see one, you will focus on it more sharply (notice that even in focussing there is a very subtle motion taking place). While you are going or being led to your table, the counter is changing its perspective, as well as the rest of the room. You swing around the table and take your seat: the room turns around, then almost establishes its balance. While you read the menu, the middle parts of the people and waitresses pass beyond the farther edge of your table, out of focus, of course. A waitress stops, you raise your head and look at hers, against the ceiling. Give your order and now watch other people's motions. There is a chap, sitting opposite you, swinging on one side (inverse pendulum motion) so as to reach more comfortably for money or something in his trouser-pocket. Just at that moment, another "interesting type" is reaching for his hat, getting up and going in the opposite direction, describing a pattern of motion symmetrical but varied in relation to the swing just mentioned. Somebody is pouring cream in his coffee; somebody is shaking the salt-shaker, the former motion being more harmonious, the latter more rhythmical, "staccato." Somebody is letting the pages of the telephone directory flow from under his thumb, then lifting up the receiver and dialing the number. The electric fan is trying to please everybody with its double motion: a fast vertical revolution and a slow horizontal swing.

Now, there are three fellows coming in and approaching the round table in the center. There is something about their movements which tells you that they have sinned against prohibition. You cannot imagine how the cafe looks to them, unless you have commited the same crime. But watch their motions. They are broad, generous and at least 25 per cent slower than the average, all of which makes them more artistic. Watch them: how lovingly and loiteringly they stir their coffee, how many variations they are able to add to the plain theme of cutting the steak, how dreamily and tentatively the fork approaches its destination. There is a flourish of an orchestra-leader's movements in their attempts to strike a match. And the heavenward swing of their heads when they blow out a generous puff of smoke! All this is enough to make you realize that the whole world is nothing but an immense cacophony of motions.

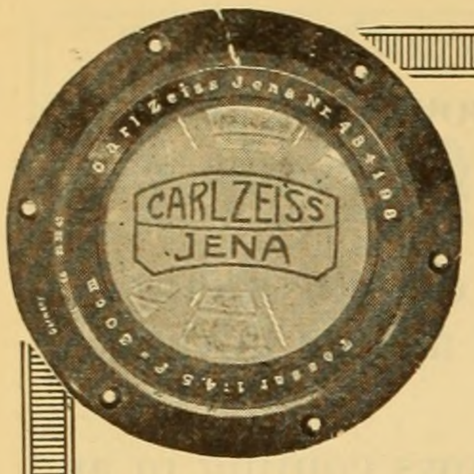
It is up to you now, if you are an artist, to make a symphony out of it.

And, by the way, I should prefer to see the scenarios look more like musical scores, with their *andantes, largos, lentos, prestos,* etc., than like the present apparent police-records: No. 234; Long-shot of Mr. X coming through a french window, (one can almost see the cross that "marks the spot where the body fell"). So much for the physical motions.

For the study of motions that appear in our thoughts, the following practice should be advised:

Mind's Eye

After you have observed, studied, grasped, digested and mastered all these external motions, turn to those of your imagination. In a preferably dark room, relax completely and close your eyes. Visualize a blank screen somewhere in front of your mind's eye. Now let your subconscious mind, your imagination play absolutely freely, but use your will only to compel your fantasy's improvisations to project themselves upon that screen; at the same time watch very carefully whatever appears, no matter how nonsensical it may seem. Now, this practice of letting your imagination



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dream absolutely freely and at the same time keeping your projecting will and your attention awake, requires a very fine mental coordination, but with practice it can be achieved. I must repeat: Let your imagination run riot, no matter how absurd its whims may appear; do not try to impose upon them some conventional continuity. Only this way you will come to see original and amazing things and you will learn that your subconscious mind is a greater artist than your conscious mind, trained perhaps for years. Someone said that in our dreams every one of us is a Shakespeare.

One cannot predict what you may see on your mental screen. It all depends on your individuality, on your fundamental make-up. It is easy to point out happenings in the external reality; but the realm of dreams, that internal and higher reality, is so much more varied and unlimited; it is the very source of the original artistic creation. But you will notice one thing common to all of us: those mental pictures *move perpetually,* they do not stop for the fraction of a second; they appear suddenly or grow and take shape gradually out of an insignificant something; they transform, metamorphase; they dissolve out and into something else; they gradually fade out or suddenly explode; they reappear but with variations, and so on. Indeed, the wealth of moving pictures that appear in these conscious dreams is immense.

(The above suggestions should not be taken as recipes how to make street-scenes, cafe-scenes, dream-scenes, etc.; they should merely lead to the training of observation. Original artistic creation cannot be taught).

Language of Motions

So far, we have made only one step in our investigation. But this first step was the most important, because we discovered the fundamental principle of the cinema-art: *its language must be, first of all, a language of motions.*

We have solved the problem optically only. But a real work of art does not please the eye alone. Besides that, it must mean something;

it must *express* something of deep human interest.

That leads us to the problem of expression of thoughts and emotions by means of the cinema. But to investigate this and the psychological value and meaning of different motions would take us more than one evening like this. For tonight, we shall pass, in a very sketchy manner, one or two points of the problem.

Today's Titles

To my way of thinking, the titles, as they are used today, are a sign of cinematic impotence. It might sound radical but it seems logical, nevertheless, to state that, as soon as a picture needs a title, and if a cinematic substitute could not be found, the subject is not good screen material.

A thought, a feeling should always be expressed in motion pictures. Those white, glaring letters have no cinematographic value. They are cold and lifeless. And it is a shame to notice that, after a very good tempo and rhythm have been imparted to a scene they are suddenly killed by a static title.

To Peer in Soul

I also believe that, very often, it is not enough to have an actor express a thought or an emotion by his mimicry alone. A way should be found to picturize his thoughts and his feelings. Figuratively speaking, the camera should be able to look within a man's soul.

When we achieve the mastery of our tools and find a way to express our joys and sorrows, our dreams and visions in an eloquent, cinematic manner, then only the cinema will have the right to claim its place among other arts.

The attainment of this goal depends mainly on you, my friends, because cinematography is primarily *the art of the cinematographer.*

The future belongs to those among you, who can handle the camera with spirit and inspiration and who can put a living thought and a vibrant feeling between the lens and the screen. The future belongs to this new type of artist: *the creative cinematographer.*

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Congress *of* Cinematography *and* Projection Suggested

President *of* American Society *of* Cinematographers Advocates Great Conferences.

By Daniel B. Clark, A.S.C.

Believes Way Found *to* Eliminate Inconsistency *of* Cinema Exhibitions.

How many times hasn't the cinematographer sat in the studio or laboratory projection room and viewed a print that projected perfectly, only to see later, when the film is exhibited in a theatre, a heart-breaking example of bad screening?

How many times hasn't one viewed a superlative exhibition of one print at one theatre and a miserable showing of the same print at a second house?

These examples have forced themselves on all identified with the making or projection of motion pictures. Whether the fault has lain with the photography, the projection methods employed, the throw, the light source, or any of a half dozen other possible causes is always difficult to ascertain.

Variance

This much is certain: the print that often is the best for one type of house is the worst for another type. In the case of important first-run theatres, special prints, to meet existing conditions, often are made. But such a procedure clearly is impractical for every theatre in which a motion picture is shown. On the other hand, the patron in the smallest house surely is no less entitled to a decent exhibition than the audience in the most magnificent theatre in the land.

Outstanding

This condition is another of those of vital concern to all those connected with the making, distribution or the presentation of motion pictures. In fact, by some it is regarded as the outstanding practical problem of the day. When one goes through the exhibitors' reports on a certain picture in the theatre owners' trade journals, and finds the photography raised to the sky by one exhibitor and panned to the dust by another, some indication is presented of how different a grade of print may appear under changed circumstances.

Uniformity

It is impossible for the laboratories to make a print to meet the requirements of every theatre which shows a particular production. But it should not be impossible for a standard of various types of prints to be adopted, and, in turn a uniform system of projection to be established, the total result of which would be to make a certain picture appear the same on the screen of the meanest theatre in the smallest hamlet as it did on the screen of the finest house in New York.

I do not mean to revolutionize equipment or anything of the sort. *The problem is not one of destruction of existing apparatus or of vested capital.* I believe that by the intelligent use of the tools that we already have on hand, we can approach a uniformity of screen presentation that will surprise even ourselves.

United Effort

This is not a problem of any one person or any one group of persons in the motion picture profession. It is of concern to all of us. Therefore, the writer looks with favor on the calling of a *Congress of Cinematography and Projection,* at which this thing can be reasoned out. At this congress, there should be representatives not only of the cinematographers, but of practical projectionists, projection engineers, studio and commercial laboratories, lens makers, projection equipment manufacturers, light source makers, directors, producers and all others who are concerned.

This suggestion is but briefly expressed in the foregoing. Many other details will suggest themselves to those who are interested. In all, such an undertaking, in which we all pool our efforts, will culminate, it is my conviction, in unbelievably good results for the profession—not only artistically but financially.

"The projectionist with his projection equipment is largely the master of our photographic destinies"

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Motion Picture Projectors

Application *for* Patent Filed *on* Lens Stated *to* Work *at* F 1.4

Application for letters patent on a lens working at F 1.4 has been filed by C. C. Minor, Hollywood lens manufacturer.

Mr. Minor's work on the new lens follows principles contained in U. S. Patent No. 1, 360, 667, issued to him on November 30, 1920.

"The plan," the preamble to Mr. Minor's present application reads, "of splitting one of the two convex lenses forming part of the combination of a Cooke lens system, has met with marked success, as exemplified by several new types incorporating such optical principles.

"The purpose and object," the preamble claims, "of this present applicatiton for letters patent is to entirely overcome the obstacles inherent in the construction of a system of four elements, whereby color correction is attained to a degree that both the primary and secondary spectrum errors are reduced to such a minimum that the claim of apochromat is wholly deserved.

"The qualities of performance," it is further claimed by the preamble, "for this new and improved objective are those of an anastigmatically flattened field, freed from coma, flare, etc. To this end objectives have been produced capable of performance at the enormous aperture of F 1.4."

Millions *of* Feet *of* Raw Stock Shipped *to* Hollywood *via* Canal

Magnitude of Los Angeles' motion picture industry is brought out in a report in the Los Angeles Times from the Eastman Kodak Company, to the effect that during 1926 approximately 11,180 cases of unexposed motion-picture film, valued at $5,200,000, will have arrived at Los Angeles Harbor, via the Panama Canal.

The water method of shipment has been found vastly cheaper and far safer than rail shipment, in that insurance on the commodity is much easier obtained, it was said.

Weekly shipments of film to this port, according to the announcement, average 215 cases. The footage for the 1926 total will amount to 268,520,000 feet, or enough to twice girdle the globe with the celluloid strips.

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Advertisers Now List Films *as* Important Item *in* Budgets

That use of the motion picture screen is an effective and profitable medium of advertising is coming into wider recognition constantly among advertisers and is claiming more attention as they make up their publicity budgets from year to year, was the consensus among members of the Screen Advertisers' Association at their recent mid-year meeting at Kansas City, presided over by A. V. Cauger, head of the United Film Ad Service of that city, in the absence of President Douglas D. Rothacker of Chicago, who was absent on account of illness.

Among the speakers during the three-day session were: Paul Kendall, advertising manager of the Long-Bell Lumber Company, Kansas City; Harvey Roemer, general sales manager of the Bell & Howell Company, Chicago; James P. Simpson, Dallas; George A. Blair, Eastman Kodak Company, Rochester; Sumter Calvert, Capital Projector Company, Chicago; H. E. Hollister, Pyramid Film Company, Dayton; Lou Holland, Kansas City, and Robert A. Warfel, executive secretary of The Advertising Commission, New York.

As a result of the meeting, the officers and a committee have under consideration the development of plans for presenting the message of screen advertising to the advertising clubs of the country in co-operation with which the Screen Association is affiliated as a department of the Advertising Commission.

There is a probability that the screen Association will conduct its annual meeting as a part of the convention of the International Advertising Association at Denver next June and give up the idea of holding a separate meeting in February, as heretofore, although decision was deferred pending consultation with President Rothacker. Several members of the association feel that more effective results would follow the holding of a meeting with the big convention, and are advocating that a meeting be arranged at the time and also that the Screen Association set up an elaborate exhibit and demonstration at Denver.

Mr. Gauger, who was host to the convention and provided much entertainment, caused the issuance of a convention publication under the name of "The Reel Dope."

DUPLICATION *of* MOTION PICTURE NEGATIVES

(Continued from Page 9)

posed area surrounded by an area of less exposure developed up denser than it should, while small areas surrounded by areas having greater exposure developed up with less density than they should. The explanation of the phenomena is simple. In the first case, the developer acting on the small exposed area diffuses into the surrounding gelatin as it becomes exhausted, and fresh developer diffuses into the spot from all sides thus accelerating development. In the other case, when the small area has had less exposure than its environment, the opposite conditions hold, development of the small area being actually restrained by the reaction products diffusing into it from all sides. If development is stopped at an early stage, the defect is quite pronounced. If, however, development is continued until the image has reached maximum contrast, fresh developer has time to soak into the film from the outside and the irregularity is smoothed out.

The "Mackie" line has a similar explanation to the "Eberhard" effect and is really a manifestation of the latter on a scale that is easily discernable in the projected picture as a sort of halo surrounding the images of dark objects against light toned backgrounds.

To Be Avoided

It is particularly desirable to avoid these defects in the duplicating process because, like graininess, they are cumulative, and they are largely responsible for the "duped" appearance of prints made from duplicate motion picture negatives prepared on a high contrast emulsion.

Attempts have been made to find a developer or developing conditions that would permit development to a low degree of contrast without producing the defects but with no success. Apparently, the only way to eliminate the fault is to use an emulsion which when nearly fully developed will give the contrast or gamma required.

Inasmuch as motion picture negative and positive films do not completely satisfy the rigorous demands made on a duplicating material, efforts were made to produce something more suitable. It was found that the charac-

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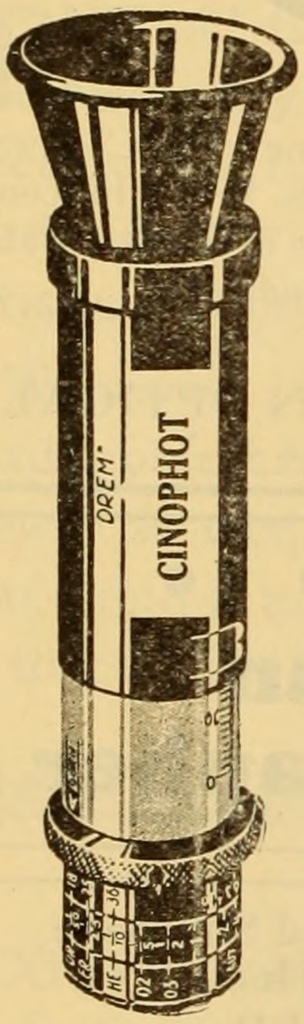
Subscribed for separately, Camera Craft, and the American Cinematographer will cost a total of $4.50 per year. As a special clubbing offer, both magazines may be had at a total price of $3.40 per year.

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teristics of an emulsion are greatly changed if a dye that absorbs the wave lengths of light to which the emulsion is sensitive is mixed with the gelatin. In the case of an ordinary emulsion certain yellow dyes have this property. The addition of the dye has the effect of increasing the resolving power by reducing irradiation or scatter, greatly extending the latitude, and lowering the maximum contrast of the emulsion. By so "doctoring" a very fine grained emulsion, a film was produced which possessed in a marked degree every desired property with the possible exception of speed. The speed, unfortunately, is rather low, being only about one-twentieth that of regular positive film. However, by using a suitable condenser system, sufficient illumination to print from dense negatives at the usual step printer rate can easily be obtained. It is practicable also to do projection printing with condenser illumination.

The dye used is a water soluble yellow that washes out during the processing operations and leaves a normal appearing black and white film. The emulsion keeps extremely well and can be handled in the usual positive safelight.

The use of this film, known as "Eastman Duplicating Film," for both master positive and duplicate negative, insures excellent tone reproduction, freedom from development defects, and a minimum of graininess.

Timing

The first step in the actual process of making the duplicate is the timing of the original negative for printing. The exposure for each scene should be such as to clearly record the details in the highlights. The exposure should not be much greater, however, than that necessary to secure the lightest detail; otherwise, the graininess of the final print will be accentuated. After the original has been timed, it should be carefully cleaned to remove all traces of dirt from any scratches that may be present on the gelatin or support. Chamois skin moistened with carbon tetrachloride may be used for the purpose.

(Continued Next Month)

(Continued from Page 11)

LAWS OF REFLECTION

THE law ruling the regular reflection of light is as follows:

"The angle that the incident ray makes with the normal to the reflecting surface at the point of incidence, is equal to the angle that the reflected ray makes with the same normal; and the incident and the reflected rays are coplanar."

For short, let us say that *the angle of reflection is equal to the angle of incidence and both rays are lying on the same plane.*

This being true, we can easily trace geometrically the path of an incident and its corresponding reflected rays.

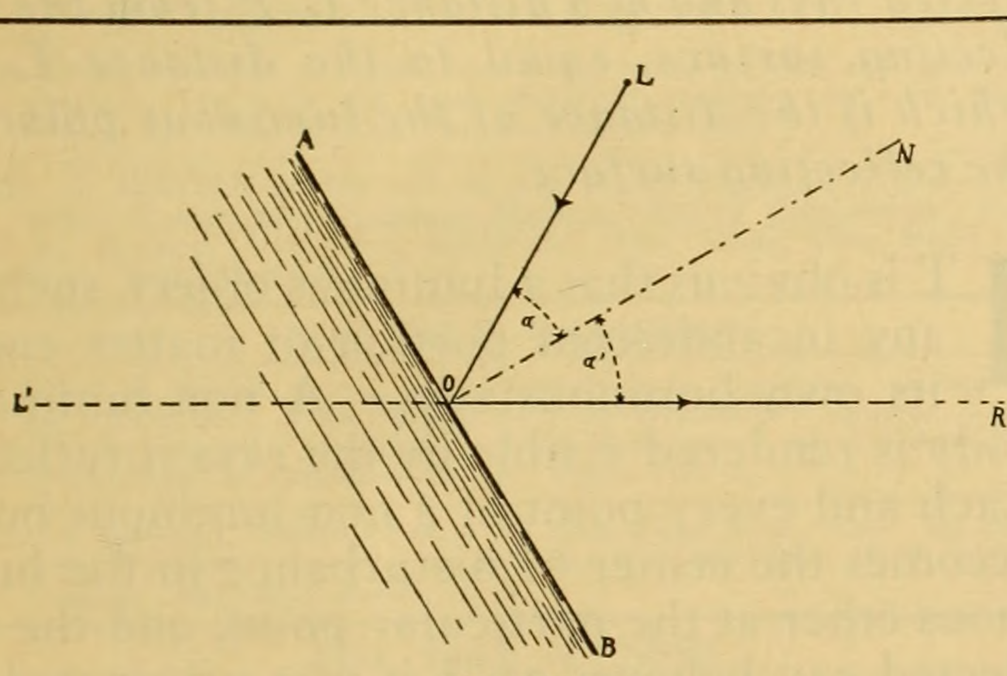


FIGURE 2

A B Equals Reflecting Surface.
L Equals Luminous Point.
L O Equals Inicident Ray.
O N Equals Normal to A B at Point O.
O R Equals Reflected Ray
L′ Equals Virtual Image of Point L.
a Equals Angle of Incidence.
a′ Equals Angle of Reflection.
a Equals *a′*.

Let A B (Fig. 2) be the section of the reflecting surface of an opaque body, a mirror for instance, and let the plane of the paper be the plane in which lies the incident ray L O, emanated by the luminous point L, and let O be the point at which the incident ray falls upon the surface.

Let O N be the normal to A B at the point O, that is to say, the line perpendicular to A B at O.

The reflected ray will follow a path O R, forming with O N, an angle N O R, equal to the angle L O N.

For the sake of simplicity, let us call the angle L O N by the letter ***a*** (alpha) and let the angle N O R be called ***a′***.
simply, ***a*** equals ***a′***.

We will then have: *angle of incidence* equals *angle of reflection;* or L O N equals N O R, or simply, ***a*** equals ***a′***.

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The reflected ray will also be found to lie on the same plane as the incident ray, in the figure, this plane being, as we said, the plane of the paper.

If A B is the surface of a mirror, and we place our eye at the point R, we will see an image of the point L, situated at L′, *behind* the mirror, on the prolongation of the ray O R, and at a distance from O, equal to the distance L O.

HUYGHENS CONSTRUCTION OF REFLECTED RAYS ACCORDING TO HIS "UNDULATORY THEORY"

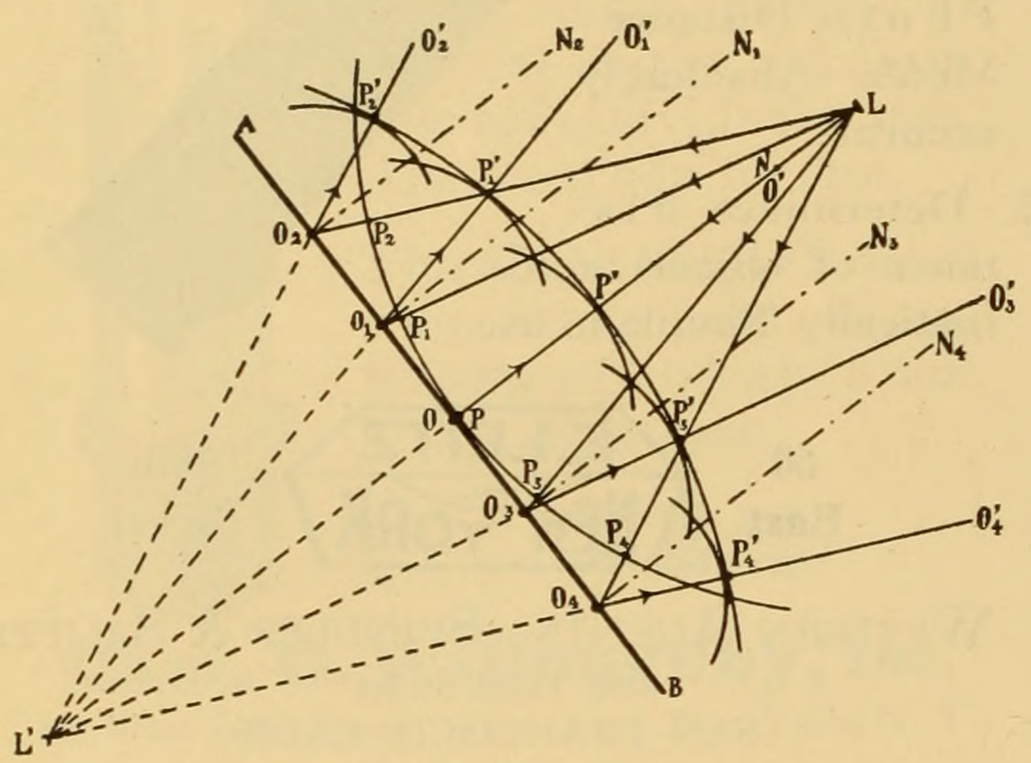


FIGURE 3

A B Equals Reflecting Surface.
L Equals Luminous Body.
L′ Equals Image of Luminous Body.
L O; L O^1; L O^2; L O^3; L O^4 Equals Incident Rays.
P^2 P^4 Equals Incident Wave Front.
O O′; O^1 $O^{1\prime}$; O^2 $O^{2\prime}$; O^3 $O^{3\prime}$; O^4 $O^{4\prime}$ Equal Reflected Rays.
P'^2 P'^4 Equals Reflected Wave Front.
O N; O N^1; O N^2; O N^3; O N^4 Equals Normals to Reflecting Surface.

LET A B be the reflecting surface and L the luminous body, emanating rays in all directions, among which we select the rays L O; L O^1; L O^2; L O^3; L O^4, falling on the reflecting surface.

As all these rays travel with the same velocity, at the time the ray L O will have reached the point P of the reflecting surface, the ray L O^2 will have reached the point P^2 and the rays L O^1; L O^3; L O^4 will have reached the respective points P^1; P^3 P^4, forming a wave front P^2 P^4.

At the same instant the ray L O strikes the reflecting surface, the point P becomes the center of a disturbance, creating a wave which bounces away from the surface. The incident ray is thus reflected back upon its own path, in the direction O L, while the ray L P^2, for instance, will have to continue to O^2, from whence it is reflected in the direction O^2 O'^2, forming with the normal N^2 O^2 an angle equal to the angle of incidence L O^2 N^2.

At the same instant in which the reflected ray O L reaches the point P′, the reflected ray O^2 O'^2 will reach the point P'^2, because light travels with the same velocity, and the distances L O plus O P′ and L O^2 plus O P'^2 are equal.

Following the same construction for all the other rays we find the reflected light to form a *wave front* P'^1 P'^4, whose center of curvature is at L′, *behind the reflecting surface, at the intersection of the prolongation of the reflected rays and at a distance L′ P from the reflecting surface, equal to the distance L P, which is the distance of the luminous point to the reflecting surface.*

IT is obvious that a luminous object, such as any incandescent portion of matter emits its own luminous rays. A non-luminous body is rendered visible by the rays it reflects. Each and every point of a non-luminous body becomes the center of disturbance in the luminous ether at the particular point, and the reflected ray behaves as if it was originated at that very point of the body.

In other words, the non-luminous body acts as a luminous one as long as it is stricken by incident light, and the intensity of its acquired luminous power is controlled by the intensity of the incident light from the luminous body, and by its own composition.

Now, let us suppose that we place a well defined object in front of, and at a certain distance from a plane mirror M, as illustrated in

(Continued on Page 25)

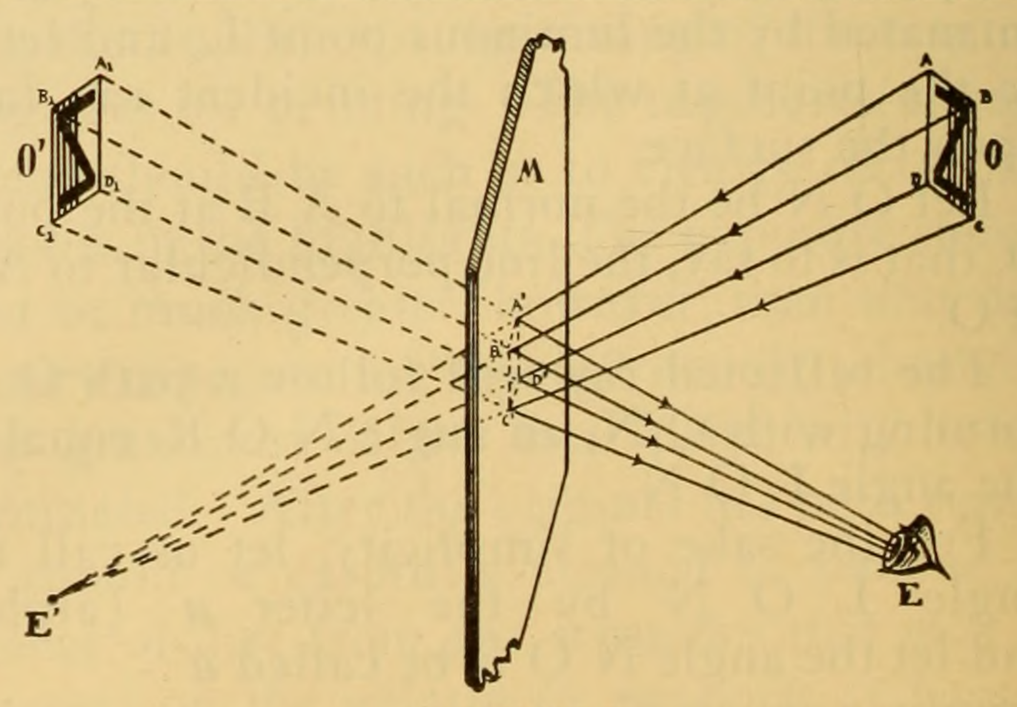


FIGURE 4

O Equals Object.
M Equals Reflecting Surface.
O′ Equals Virtual Image of Object O.

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(Continued from Page 24)

Let the object be a card O, whose surface is perfectly defined by the lines AB; BC; CD and DA.

The path of the rays emitted by the points A; B; C and D strike the surface M, at the points A′; B′; C′ and D′ and their reflection A′E; B′E; C′E and D′E is easily found, according to the laws of reflection.

The image of the object O will then appear on the prolongation of the reflected rays at O^1 to an eye placed at the point E, and at a distance from M equal to the distance of the object O from the reflecting surface.

In other words, the image of O will appear at O′ at the same distance as if the object was viewed from a point E′, its view unincumbered by the mirror.

The image O′ will then appear of the *same size* as O, it will be *erect,* but *reversed* as to sides.

It is evident that the construction of the incident and reflected rays can be traced from each and every point of the surface of the object and the complete image of O will then be found to be formed at O′.

Such an image has no real existence, and can not therefore be collected on a screen. It only appears to the eye, as being formed at O′, and is called *"virtual"*.

INTENSITY OF REFLECTION LIGHT

IT is obvious that, as the incident light is partially absorbed and partially scattered, the intensity of the reflected light is *less* than the intensity of the incident light.

The intensity of reflected light is also dependent upon the smoothness and degree of polish of the reflecting surface, upon the obliquity of the incident ray, and upon the nature of the reflective surface.

Surfaces of different nature affect the intensity of the reflected light, even if their degrees of smoothness and polish and the obliquity of the rays are the same.

It is of common occurrence to observe that the highly reflecting silvered surface of a mirror reflects more light than an equally smooth surface of a sheet of white paper.

Less commonly observed, but easily veri-

fied, is the influence exerted by the obliquity of the incident ray.

If we stand on the shore of a large body of water, such as a tranquil lake, we can readily observe that at high noon, when the sun is approximately at the zenith of the lake surface, we can look at the water without being disturbed by any glaring reflection. As the sun nears the horizon, we will notice that a sufficient amount of sunlight is reflected by the water, so as to bother the sensitiveness of our eye. This will happen when the incident and reflected rays form equal angles with the normal to the water surface. The more the sun continues to approach the horizon, the greater is the obliquity of the incident ray and the greater becomes the intensity of the reflected ray, to such an extent that if the eye is placed at the proper angle, the glare effects it almost to the same extent as if the sun was looked at directly.

The smoothness of the reflecting surface is obviously an important factor when a maximum of reflected light is desired. The roughness of a surface is formed by a conglomeration of small surfaces facing the incident light under different angles. In viewing such a surface, our eye will only be struck by the reflected rays striking the surfaces whose position is such that they answer the laws of reflection. Only a portion of the surface will thus respond to these requirements, and the intensity of the reflected light is then diminished in proportion to the degree of roughness of the surface.

The infinite number of conditions in which light can be reflected render impractical an average calculation of the intensity of reflected light. As a reference, taking the incident ray perpendicular to the reflecting surface, it has been found that:

Mercury reflects 3/4 of the incident light;

Silver reflects 3/5 of the incident light when its surface is smooth and highly polished;

Glass reflects 1/25 of the incident light;

Water reflects 1/50 of the incident light.

LET us note here, that in the study of light, when mention is made of a mirror, a distinction must be made between the well known object of everyday use and an optical mirror.

In optics the reflecting surface alone is called a mirror, while in a glass mirror the glass is merely the support and the protection to the silver coating which is the real optical mirror.

In fact, in a glass mirror the front surface of glass and the silver coating are two distinct reflecting surfaces and this is proven by the following experiment.

Place a lighted match in front of a glass mirror and look at it obliquely. Two very distinct images of the match are seen; one reflected from the silver coating, and the other from the front surface of the glass. Furthermore each one of these images become a luminous object in respect to either one of the two reflecting surfaces, and other images of the match are seen which would multiply to an infinite number were it not for the absorption and scattering of light that takes place at each reflection. These images are seen to gradually diminish in intensity, until the eye is not any more affected by their luminosity.

ONE of the uses made of reflected light by the photographer is to reflect the light of a luminous body in order to more strongly illuminate the object he desires to photograph.

Of this order are the various kind of reflectors used by the cinematographer in outdoor work, and the white surfaces of the interior of the art lamps and backing the mercury tubes in studio photography.

Reflection of light is applied in the Graflex type of cameras, in which the image formed by the photographic objective is reflected by a 45° inclined mirror, to a focusing ground glass.

An interesting application of reflected light is the prismatic reflection and side reversal of the image formed on the focusing ground glass and the prismatic reflection and side reversal of the rays emanated by the subject, before entering the photographic objective. This reversal of the image is extensively used in the photography of object destined to be reproduced in printing, in the half-tone color process.

(To Be Continued Next Month)

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With best wishes, I am

Very truly yours,

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